

**MSR**

MOUNTAIN SAFETY RESEARCH

NEWSLETTER

**MSR**

Published by Mountain Safety Research, Inc.

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Page 5-1

HALLELUJAH!

Equipment, Inc.

Real progress is being made on two fronts: reliable ice axes; and Recreational

SEE PAGES 5, 6, 7 re THE MOUNTAINEERS

MSR ALL-METAL ICE AXES

Acceptance of the Thunderbird axe far exceeded our plans; over 2,500 have been sold. We got far behind in delivery and had to work overtime and re-tool to catch up. Orders continue to come in at a brisk pace, but we have managed to get ahead and now have an inventory of about 500. All sizes are in stock.

The Thunderbird model has been the favorite choice by far; the Eagle has a very useful place for ice climbers and is chosen about 10%; the St. Parbat model sales are nearly nil, and this model is being discontinued when existing stock is sold.

Field Results Jim Wickwire and Ed Boulton came in with the first enthusiastic report. They were doing a first-ascent route on Willis Wall on Mt. Rainier. They state flatly that the Thunderbird saved their lives twice in self-arrest when their crampons wouldn't hold on a 45° glare ice slope at 13,000 feet. They were sure that their old-style axes would not have stopped their falls.

A group of 40 experienced climbers spent a whole day on Nisqually Moraine testing the self-arrest properties of the Thunderbird and Eagle on steep, hard snow. They were highly impressed with the holding power of both, being able to stop team falls where the older style axes just skidded along, only making a mark.

Before these trials, some climbers were wondering whether the broad pick of the Thunderbird would "weather-vane" and rotate uphill when the shaft is at an angle to the fall direction. They found that this does not happen due to the excellent hooking angle which pulls the pick under the snow to counter the weather-vane effect.

Another group tested the holding power of the shafts in fully-consolidated June snow. The results showed the marked superiority of metal over wood. On load, the wood broke; the metal never broke at all, and continued to carry the load even though bent. See the full report in the next issue.

This group also confirmed the superior step-chopping ability of the Thunderbird.

Several climbers had suggestions for improvement. The first was an objection to the sharpness of the cutting edges as shipped, as being a hazard. This is true, but it is equally true that a cutting tool should be sharp to do its work well. If you round off the tip of the pick of the T-Bird, you will spoil its digging-in capability on ice and very hard snow. We agree that the adze is not used very much, but rather than dull it, we prefer to cover it with a soft rubber guard. Even when dulled, any adze can damage the face in self-arrest. We had to have a special mold made (\$850) and, unfortunately, didn't get a supply of guards at the beginning. We have plenty now. If you haven't one already, please order a guard for the adze, item 132, 50¢ plus 10¢ for shipping if ordered alone. The pick guard is good to have too; item 131 (for T-Bird) 50¢, no extra postage.

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A recent survey shows only one climber in five is really safety-conscious.

Another question concerned the hardness of the cutting edges; when chopping ice and imbedded stones, the edges will deform. At present the edges are heat-treated for strength and ductility, not maximum hardness. If the edge deforms, it can be straightened again by hammering and filing.

We are increasing somewhat the hardness of the head to decrease this effect, but if you are regularly chopping such ice, please order a special with case-hardened edges, \$2.50 extra. If you already have a standard model, we will take it back in trade at full price for a special.

The glide-ring stop screw was considered by some to be too small. We made it with a slender profile so it would not unduly impede entry of the axe into hard snow. If not already, please line up the flat with the axis of the axe. But if the size bothers you, wrap it with adhesive tape or we will send you a larger one. Some of the stop screws broke. We traced this to a rod of incorrect metal. Remove the stop screw and then test it by wiggling it gently while held by pliers on the short end. For a new stop screw, send a self-addressed envelope, marked "stop screw". No letter is needed, and we will pay postage.

The neoprene rubber coating was selected after testing of six other covering systems. It provides superior grip, both to the hand and to the snow when plunged in for a belay. Vinyl shrink tubing and epoxy lacquers are much more slippery. Fiberglass is susceptible to damage by rock impact and cutting by the belay rope. Gum rubber catches the glide ring. Hypalon has poor adherence and is hard to repair. The neoprene coating we use can be abraded, of course, but it can also be repaired by you at the end of the season if needed. Order MSR Axe Coating, item 152, \$1.65 less 15¢ patronage dividend = \$1.50 net. It comes in a 3 ounce can with built-in dauber.

Orange is by far the best for safety and visibility, but we offer red, green, and blue also. Use a permanent ink felt pen to mark your name and city on the shaft. This helps you to get acquainted in a new group, and also helps you find your axe in a pile.

The MSR coating is soluble in mosquito repellent and some sunburn creams. Wipe your hands free of these materials before handling the axe.

Some users have found the coating on the head of the axe chafes the bare hand after a few hours. The holding power of the fingers or glove on this coating is superior when in self-arrest. But if the chafing bothers you, try wrapping with waterproof adhesive tape.

One user asked how to round the contours. Try two-component epoxy (stiff type) from the hardware store. It can be shaped by filing after hardening. (Scrape off the paint first.)

PRICE CHANGE In the past, sellers of wooden-shafted axes could alibi around the unreliability by saying that they were selling items which were normal in world commerce. We set out in Feb. 1970 to establish a new world standard for ice axe shafts, selling the MSR metal-shafted axe at \$37.50. Sales were too small to make any impact; so we cut the price in Feb. 1971 to \$13.75 as an introductory price to get 2000 of them out in the field quickly. This was accomplished in July, which ended the introductory price. The new regular price is now in effect: \$19.95, less \$2.00 immediate patronage dividend equals \$17.95 net. This is a lot better than our old regular price of \$37.50 and better than the Interpal all-metal axe at \$28.50 (with wrist loop) and the SMC axe in the REI catalog at \$36.00 net. Uniform postage 75¢ west of Mississippi, \$1.15 east, plus 5% tax Washington State only.

We are now in production at our branch in England for export to Austria, France, Germany, Italy, and Switzerland. We are using the same system there, an introductory price until 2000 are sold, and then a normal price. **MSR ICE AXES ARE FINE CHRISTMAS PRESENTS. ALSO, PLEASE ORDER YOUR OWN AXE NOW. DON'T WAIT UNTIL SPRING BECAUSE WE MAY NOT HAVE ENOUGH IN STOCK** You may be wondering why we show a patronage dividend. REI is now handling some of our products, including axes. They have a pattern of selling at a list price with a rebate of 10% the following year. We are now doing the same on our items which they also handle, except we avoid bookkeeping by granting the rebate without delay.

WOODEN SHAFTED ICE AXES

We, and others, have done an extensive amount of material testing of wooden shafts, both in the lab and in snow. Reports of breakage in the field continue to come in. One axe even broke in self-arrest. We do not want to use space in the Newsletter for these reports, but here is our conclusion.

My personal opinion is that all plain wooden-shafted axes are obsolete, and that no climber can afford to take the risk of uncertainty as to the strength of wooden shafts. No one yet has developed a predictive test

for wood, and the Forest Products Institute in England believes this can't be done due to the progressive crushing of wood cells under meaningful test loads. Standing on the middle of an end-supported axe is just not good enough.... This view is supported by Pit Schubert, Chairman of the Security Group of the German Alpine Club (Alpinismus Magazine, May and June, 1971). We quote, translated:

"The wooden shaft is most backward according to the latest developments of the technique, not to say one of the most dangerous safety links in the safety chain in ice. Enough accidents have become known where an ice axe shaft (breaking) led to the fall of a team."

RESHAFTING WITH ALUMINUM of the customer's ice axe has been discontinued because we have no faith in the older designs of axe heads to hold in self-arrest on hard snow and ice.

WHAT PLACE FIBERGLASS? Fiberglass is inherently notch-sensitive and is weakened by impact on rocks. A loaded belay rope will cut in as it runs, as in crevasse rescue when used as the rope-support axe at the edge. Most important, fiberglass fails catastrophically when overloaded, meaning that it breaks in two. I'd rather have a bent metal axe than a broken fiberglass one after holding (or hoping to hold) a fall. Fig. 37, 38. We will still sell fiberglass kits, but with the above warning.

Adding fiberglass to wooden shafts had a place before the development of the MSR axe because of low cost and immediate availability. It was effective in reinforcing the unidentifiable 10% (we judge) of the wooden axes which are incredibly weak. Our first kits contained fiberglass tape which was 8" wide. This brought the strength up to about equal to the top one-third of the wood shafts. If your use of an ice axe is moderate, this is still probably OK.

Specify color: red, orange, green, or blue

FIBERGLASS KIT Item 59-8 \$3.65 (Same price)

However, if you might be using your wooden axe for holding hard falls, such as from above you to below you on a steep fast slope, and you don't want to change to a metal-shafted axe, we now recommend 12" wide tape for 3 layers. See article on drop tests on snow.

Shipping Wt. 1 lb.

Specify color

FIBERGLASS KIT Item 59-12

\$4.45

A larger glide ring will be needed. Measure the larger diameter of the wood and we will select the proper ring complete with nylon webbing loop.

GLIDE RING

Item 15-4

\$1.95

HELMETS

The Mountaineers have helped to popularize the use of helmets by specifying them in their climbing courses. Good idea, but they didn't do any testing nor did they test the types on the market. Many of the cheaper ones are little more than pebble guards, and might come off in a fall because they have only a single chin strap. The most expensive one, Bell Toptex, is described in the REI catalog as "highly acclaimed." By whom? "with a foam shock-absorbing lining". Oh?

The Royal Air Force Establishment pointed out to us the danger of using a foam lining as hard as in the Bell Toptex (B-T).

Figure 40 shows a 1" diameter wooden rod being used as an indenter.

The lower arrow points to an indentation made by the rod. The deformation pressure was 200 pounds per square inch (psi). Assuming a loaded area of 25 square inches of head trying to dent the foam, the force would be 5000 pounds. The neck vertebrae crush at 1400 pounds, so how can the B-T hat be described as "shock-absorbing"? There is a pad of rubber material 1/4" thick in the center. It would yield about 1/8 inch maximum. This is not enough.

By contrast, the Joe Brown (J-B) and Römer (foam model) helmets have two shock-absorbing systems: foam plus a nylon webbing suspension. The suspension breaks first, and then the foam dents. The Römer has a clearance of 5/8 of an inch between the suspension and the foam; the J-B one inch. This clearance is good, both for ventilation and to allow a small sharp missile to deform or partly penetrate the shell before contacting the skull. See Federal Spec. GGG-H-142G, which calls for 1-1/4 inches.

ANSI 289.1-1969

The foam deformation pressure for the J-B is 110 psi, with nearly full recovery of shape. This recovery property would be useful if you bang your head several times in a fall. The Römer, 90 psi, very little recovery. The B-T, 200 psi, very little recovery.

Ventilation in the B-T is nil; J-B, good, Römer, good.



Fig. 37

Two layers fiberglass on wood.
700 pounds center force.

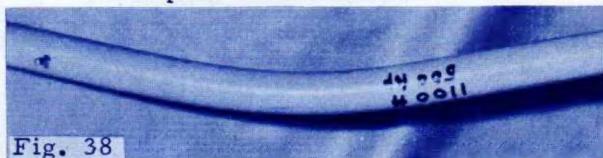


Fig. 38

MSR aluminum.
1100 pounds center force.

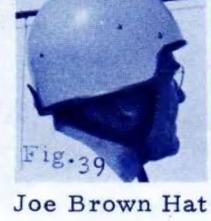


Fig. 39

Joe Brown Hat



Fig. 40

1" dowel pushing into foam

To check impact resistance of the shell, we beat on the hats with a heavy iron pipe. Not very scientific, but all survived.

The J-B helmet has the best coverage, coming down farther around the back and sides of the head. This could be useful in a fall.

Chin straps should include straps to the back of the helmet to retain the helmet on the head during a fall, as in the J-B and Römer helmets. See Figure 39. The Y straps of the B-T are not good enough.

Energy absorption information hopefully ready for the next issue. This test work takes a lot of my spare time. Anyone else want to do the job?

DROP TESTS ON SNOW

How high are the forces developed in a fall on hard snow? Respectable!

We loaded a burlap sack with 176 pounds of snow, tethered it to a snow fluke through a dynamometer, and shoved the sack over the edge, free-fall. 45°, hard-base, loose-surface corn snow, 15 feet above the anchor, 17 feet of rope, 32 feet of free-fall plus stretch. August 29, 1971, 50° F., cloudy.

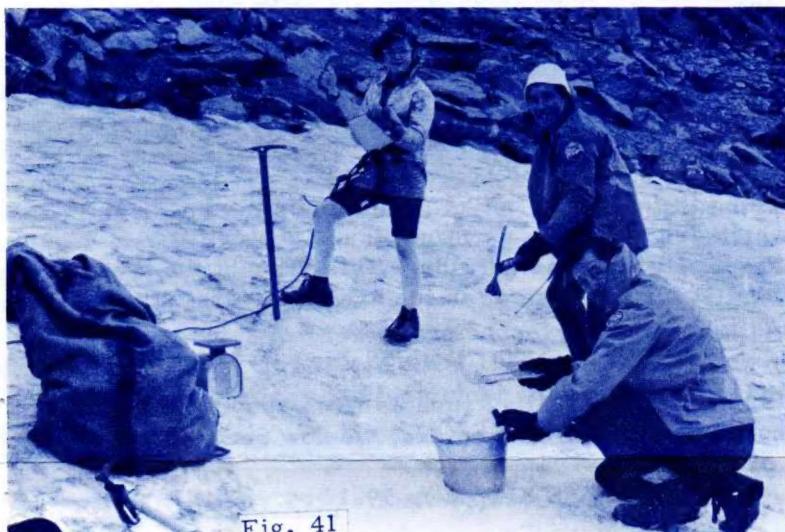


Fig. 41



Fig. 42

Filling the sack with snow. Louise Penberthy, Dixie Gatchell, and Clay Gatchell

Ready? Larry Penberthy



Fig. 43



Fig. 44

Broken
Manila

Peak Force

A. Edelrid Rope	11 mm	Burlap against snow	400 pounds
B. Manila Rope	7/16"	Burlap against snow	660 pounds
C. Edelrid Rope	11 mm	Plastic covered	690 pounds
D. Manila Rope	7/16"	Plastic covered	Rope broke.

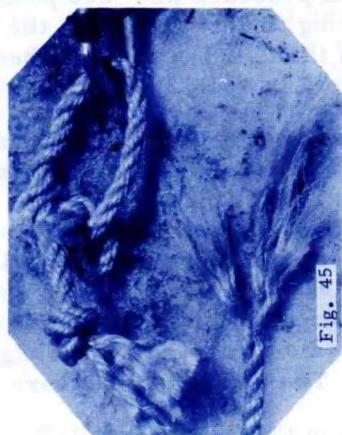


Fig. 45

As expected, the rough surface of the burlap absorbed some of the energy, as compared to the plastic sheet covering. Wool clothing would have some advantage over nylon wind pants.

The figures above should not be relied on too much. The tests spanned three hours, and the snow changed, first softer, then harder. The sack was not oriented the same way each time when the rope came taut. The number of tests was too small. Only one snow condition was tried. There were no crevasse falls. We would be delighted if someone would repeat and extend such tests.

REASONS FOR FIELD TESTING The Mountaineers publish a book, Mountaineering--Freedom of the Hills, 1967 Edition. Page 267 says: More concepts are in order, and also many more systematic testing programs employing strain-gauges to measure forces developed in falls.... how fast a fall a self-arrest can be expected to control.... exactly how strong are axes. Noble thoughts, but not matched by any action.

The committee I headed (1968-9) was all set up to do the work on snow on 7-8 June, 1969. We were going to fill burlap bags with snow and drop them down snow slopes and into crevasses, measuring the forces on the ropes. We were going to measure the holding power of belays and team-arrests. We were going to compare manila, the rope used by The Mountaineers, with modern ropes. The materials and meters were on hand and a team of eleven signed up.

But just before that date, the Board of Trustees torpedoed the program by dissolving the committee. Five weeks later, two of our members were dead and one in the hospital, due to a 2,000 foot wild fall down Mt. Rainier and 110 feet more into a crevasse. They were using manila rope. Our field testing may have been helpful in preventing this accident, because we would have pointed out the hazard of using manila due to its high-shock characteristic which tears out self-arrest when trying to hold a team. Chris Marshall, the survivor, was in self-arrest at the start of the fall. Observers say that the individuals made continuous attempts to stop the fall by self-arrest, but would be pulled out of position by others on the team who were at that moment out of control.

Incidentally, The Mountaineers continue to use manila rope, 1970 and 1971. See next issue for an account of a similar accident on Mt. Baker in 1970.

LINES OF DEFENSE RE EQUIPMENT AND METHODS

Manufacturer The first line of defense for the mountaineer regarding equipment and methods is the manufacturer. He controls the strength of materials used and their functional shape. He also controls the uniformity and compliance with standards which have been set up internally and externally by the industry and users.

Gee, that sound good! Read it again! Right out of the textbook for Quality Control 101! And it works to a considerable degree, when we remember that we cannot expect perfection. We should also remember that we cannot sit back as consumers and expect everything to be done for us. Read on.

Retailer The retailer is or should be an important line of defense for us consumers. He is working with the items he sells all the time, and gets input and feedback from both directions. This defense works to a considerable degree. If 1,000 users complain to REI that the plastic rainwear they sell shreds in a cold wind, they might discontinue the item or put pressure on the manufacturer to use a better material. But this line of defense sometimes fails, too. Read on.

We, the Climbers The buck stops here. You and I are the ones who get wet and cold; or take unintended risks when our crampon or ice axe breaks at 13,000 feet; or maybe even die when we go out with inadequate equipment or training.

How can the consumer protect himself from slips in the manufacturer-retailer chain to him? This is not easy. If REI and Seattle Sporting Goods had put warnings of shredding on the plastic rain coats my family bought, we wouldn't have bought them. But they didn't, and we got cold and wet. Each customer in this case becomes his own testing bureau. In an effort to counter such problems, we band together in clubs, take courses, read textbooks, and rely on leadership provided by such clubs. Now we come to the point of this article. I feel strongly that the clubs should take a stronger role in the checking out of equipment for the protection of their members. This is their duty; if they are not willing to perform this function, they should stop offering climbing courses.

A member of The Mountaineers, just graduated from the basic climbing course, came to me with a broken axe. He went through the course relying on it and was dumbfounded when it broke when he was using it to pry out a piece of snow for his small daughter to chew on while on a trail hike.

He was incensed both that REI should have sold him such a weak ice axe and also that The Mountaineers lecturers should have failed to tell him that such unreliable equipment is on the market. Their textbook (p. 30) says: The shaft undergoes the major strain. It may be made from ash, hickory, or epoxy-laminated wood; all are satisfactory... though hickory is five times stronger... Selecting the length is a novice's main worry.... He now knows better.

He had also bought a manila rope because The Mountaineers use manila, and reasoned that it must be OK. Now that he knows better, he has changed to nylon. But he thinks it is beyond belief that The Mountaineers Climbing Course continues to provide manila ropes to its students for actual climbs in the face of its own warning (p. 131): "The grade of manila used by mountaineers certainly cannot be given any considerable degree of trust ..."

It is also incredible that the present Board of Trustees should allow this failure to investigate to continue. I moved (Jan. '71) that a Safety Methods and Equipment Committee be established to study, test, and report to the members on all equipment which is specified or supplied by The Mountaineers to students in all courses offered by The Mountaineers. This is certainly a modest undertaking, about the minimum that the club ought to do for the protection of its students. The program was to have a budget not to exceed \$2,500; \$500 from climbing course fees, and \$2,000 from the Literary Fund, with the information obtained to be available to the next edition of Mountaineering--Freedom of the Hills. The motion was tabled until April and then defeated.

Another motion on this subject was barely passed (6 to 5), but it is now buried in its third study committee. There is no budget, no action committee, and no action... Just after it passed, one of the trustees said he didn't see why a conservation club should be testing equipment. Further, he couldn't see anything but a vague justification for having skiing in The Mountaineers. . . . I believe that his view of the club is too narrow. The Mountaineers is not just a conservation club; it has become a quasi-public organization, with room for all outdoor activities. Certainly we want to continue conservation activity; as a member of the board, I have voted for 94% of the conservation resolutions. And the books have made a lot of profit (\$150,000). But the attitude of do-nothing re validation of safety equipment on the part of the board could be dangerous: first for the individual student; and second for The Mountaineers as defendant in a negligence lawsuit. The answer is to elect trustees who are more mountain-activity minded. I hope you will vote for the following:

JOAN FIREY 1955 - Exploratory mountaineering, writer "Freedom," Bulletin, Annual, Art.

BOB LANGENBACH 1965 - Climbing Committee, Chairman Intermediate Climbs, skiing, Mountain Rescue Council.

DAVE McBRAYER 1956 - Climbing Committee, Chairman Safety Committee, skiing.

DICK MITCHELL 1956 - Climbing Committee 3 yrs., organizer and Chairman First Aid Committee, National Ski Patrol, Mountain Rescue Council.

MORRY MUZZY 1947 - Climbing Committee 9 yrs., Chairman 1 yr., outings, skiing, Board of Trustees 4 yrs.

SEAN RICE 1959 - Climbing Committee 4 yrs., outings, organizer Map & Compass Training Program, skiing.

SAFETY AREAS NEEDING ATTENTION

Ratio of Students to Instructors: The Mountaineers climbing courses had a record high enrollment this year: 438 basic climbing; 225 alpine travel. The cadre of staff, leaders, and (active) intermediate students was significantly smaller. This led to adverse ratios, such as on Sloan Peak: one intermediate graduate (the leader) and one intermediate student to 20 basic students. Sloan Peak is a substantial mountain with a glacier; there should have been more experienced climbers or fewer students, both for safety and for instruction. Since the Climbing Committee did not correct this situation, the Board should have stepped in. I know the By-Laws say the Board may delegate, but delegation without control is irresponsibility.

The Mazamas have a better system. They provide 6 instructors for each 24 students, making a field trip of 30. If they don't have the 6 instructors, they don't take on the students. Thus, they get away from the Hannibal's-army-crossing-the-Alps aspect of The Mountaineers. These 30 also climb together in sub-groups of 10 (2 instructors to 8 students). The students have a better chance to learn and can get better acquainted.

Ropes: In view of the written challenge in 1969 of the use of manila ropes for actual climbs, the Board should have stepped in to require adequate research when the Climbing Committee did not. The Mazamas, by contrast, charge a fee for climbs and provide modern ropes.

Hard Hats: Why shouldn't The Mountaineers do the unfinished work on testing; and then stimulate the suppliers to do better? This is the Board's responsibility, because they control the naming of a work group and its budget.

Ice Axes: Three axes broke at snow practice this year under light loads. When this was brought up at the Board meeting, the question was dismissed lightly with the remark, "This happens every year; nothing to get excited about."

Techniques: David Roberts (Ascent, Sierra Club, July '71, p. 48) takes a few shots at mountaineering books including "Freedom": "other sins ... such currently debated practices as the dynamic belay." "The boot-axe belay. Anyone ... intelligent ... knows how dubious it is." There have been several challenges of these hallowed techniques, and The Mountaineers should re-examine them in the light of modern materials and knowledge. Many individual members favor such activity, and 324 voted formally for it last October as a By-Laws Amendment. The problem is that there is no vehicle in the club for doing this work. The responsibility for this gap is clearly on the Board. 324 (members) is a substantial number, and should not be ignored. They feel their lives may be at stake.

This is not just theory; on Mt. Baker last year, the last member of a rope team fell 60 feet into a known crevasse and dragged the other two on his rope team in with him. They missed landing on top of each other by fantastic luck. The report says: "The Climbing Committee reviewed the accident and after thorough discussion agreed that the climb was carried out in a competent manner using accepted mountaineering practices." No protective belays had been placed; team arrest failed. Again, the shock loads were high due to use of manila rope. What if the crampons of the second and last persons in had landed on the face and body of the first person in? Would this still have been an "accepted mountaineering practice"? Weren't the two beginners on that rope entitled to something better?

One specific technique to re-study is the old Swiss static ice-axe-loop belay. It is quick to apply and remove, and does not delay a party unduly. It isn't reliable with manila rope and wooden axes, but it is worth looking at again with modern equipment.

WHY THE MOUNTAINEERS? In addition to the direct responsibility any club has to its members-students, The Mountaineers have a special responsibility because they are in business for profit selling instruction and related books to the general public.

Those of you Mountaineer members who agree with the need for methods and equipment testing, please send your name, address (including zip), and phone number on a 3" x 5" card or paper. Last name first for filing. Please print. We will have some special mailings for you.

RECREATIONAL EQUIPMENT INC. There have been big changes since Jim Whittaker took over as Manager at the first of the year. The catalog guarantee has been greatly broadened; a Quality Advisory Committee of volunteers has been formed and is active (first report May 10, 1971); a full-time Safety and Quality-Control Engineer has been hired (May, 1971); and the attitude toward returns and adjustments is definitely moving toward the generous side. The improvement is so great that REI is off our needs-attention-urgently list..... For example, they fixed the defective snow shovels; the sleeping bags with defective baffle material are being exchanged without question; the Nester Ice Screw is not on sale; the Braided Goldlon low-elongation rope is no longer being sold; the dangerous carabiners are all gone; the SMC angle pitons, one batch of 2-1/2 and 3 inch sizes only which cracked due to hydrogen embrittlement, have been recalled..... This is progress. If you have a problem that isn't being taken care of, write or phone Cal Magnusson, the new Safety Engineer.

News Item re SMC REI has sold all of its half-interest in Seattle Manufacturing Corp. to the other owners. SMC makes carabiners, pitons, and other mountaineering items.

GRAIN IN METAL RE CRAMPONS

Molten steel freezes in somewhat cubic crystals when cast as an ingot. During unidirectional rolling, these grains are elongated to fibers resembling Shredded Wheat. The metal has good properties in the long direction, but not so good across the grain. You can observe this effect readily with a heavy paper napkin. Cut out two angle pitons, one 90° different direction from the other. Fold to look like an angle, and then pull them apart lengthwise. The one with the cross grain tears much easier. The same effect can be noted in aluminum foil.

Now examine the ring posts of an REI/SMC crampon having loose rings. The grain runs across the arm. If the arm is bent after heat-treating, the remaining strength is reduced. Further, the plating cracks,

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water gets in, internal rusting is accelerated by the galvanic effect of the (nickel) plating, and there is a further drop in strength.

This is not just theory. One of the front arms of a 1969 crampon, worn by Dixie Gatchell, broke off about 80 feet above the biggest crevasse in Ingraham Glacier a few weeks ago. Her husband, Clay, took the crampon back for replacement but the floor manager would only send it back to Seattle Manufacturing Corp. Instead, Clay brought it to us. Our investigation showed: the metal of the broken arm is cross-grained; the arm had been bent out 10°; the nickel plating had cracked; and rusting had taken place in the cracks under the plating. The grain structure of the broken arm is shown in Fig. 46. Cracking was visible at the bend of the opposite arm. Rust stains showed around the cracks. Fig. 47. This opposite arm broke off readily, estimated at 40 inch-pounds of bending force. An arm that had not been bent after plating broke at about 80 inch-pounds, after bending 25°.

What does this mean to you if you have a pair of REI/SMC crampons? First, did you bend the arms for a better fit? If so, examine the bend for cracks with a 10X magnifier in good contrasty light. Look especially for rust stains around the cracks. If these evidences are apparent, better take them back. The 1968 catalog stated: "Uniform tempering permits a reasonable amount of bending of the ring posts." The following year this permission was deleted. There should now be a warning: "Do not bend the ring posts at all." If not bent, the posts are probably strong enough.

Crampon testing continued next issue.

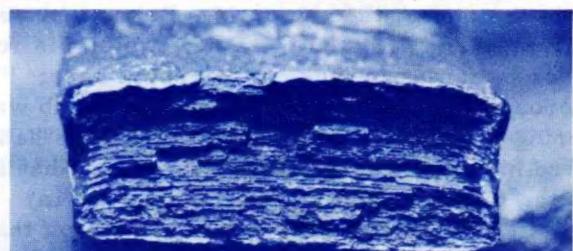


Fig. 46

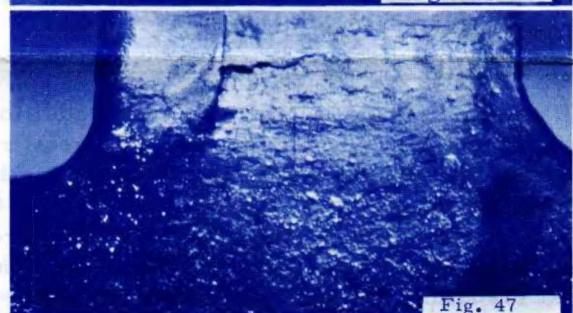


Fig. 47

Sticht and Munter Friction Hitch I've been getting some static from Ed Leeper and John Armitage that these devices can give too much restraint if the rope runs at angles through carabiners and the belayer clamps down as hard as he can. I retort that the same problem arises with a hip belay if the rope has run 120° more through carabiners. The answer for you is to practice holding falls. Rig some old tires to a rope through a pulley up in a tree and down through another at the base. Use 5/8" manila or 1/8" steel cable from the weight down to the belay position. At that point, tie on the climbing rope. If you use nylon climbing rope all the way, the stretch of the rope will be too much for these devices to work. . . . The Italian Friction Hitch should have been called the Munter Hitch, after Werner Munter of Switzerland.

CLIMBING COURSES There may be a shortage of classes next spring. For fall and winter courses, try: Northwest Mountain Guides, Jim Mitchell and Claude Gagnon, P. O. Box 796, Issaquah, Wa. 98027, phone 392-5995; University of Washington; and the community colleges.

ROYAL ROBBINS LECTURE November 1, 8:30 p.m., Civic Center Playhouse.

NEWSLETTER EXPENSES: Issue 4 cost \$4,067 in direct expenses, for a distribution of 14,000: printing \$1,021; mailing list upkeep \$1,349; addressing \$716; postage \$301; secretarial \$780. Testing cost varies, but has averaged \$1,500 per issue paid out for wages of employees, equipment, and materials. Contributions this year total \$2,549. Expense for each of 1, 2, and 3 has been about the same. Now that we have shifted over to more Consumers Union approach and less catalog, we will be dropping all names from the mailing list who do not contribute at least 40¢ per issue. Look at your address label. The numbers after your name shows your contribution. (Our records are not all that good, so let us know if incorrect.)

Gratitude to Ray Coulter, who has helped with metallurgy, testing, and photography.